A.D. 1870, 19th April. N° 1137.

# SPECIFICATION

OF

DAVID FORBES
AND
ASTLEY PASTON PRICE.

## TREATING SEWAGE AND PRODUCING MANURE.

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# A.D. 1870, 19*th* APRIL. N° 1137.

## Treating Sewage and Producing Manure.

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**LETTERS PATENT** to David Forbes, Consulting Engineer, of York Place, Portman Square, and Astley Paston Price, Consulting Chemist, of 47, Lincoln's Inn Fields, both in the County of Middlesex, for the Invention of "IMPROVEMENTS IN THE TREATMENT OF SEWAGE, AND IN THE PRODUCTION OF MANURES."

Sealed the 14th October 1870, and dated the 19th April 1870.

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**PROVISIONAL SPECIFICATION** left by the said David Forbes and Astley Paston Price at the Office of the Commissioners of Patents, with their Petition, on the 19th April 1870.

We, DAVID FORBES, Consulting Engineer, of York Place, Portman Square, and ASTLEY PASTON PRICE, Consulting Chemist, of 47, Lincoln's Inn Fields, both in the County of Middlesex, do hereby declare the nature of our said Invention for "IMPROVEMENTS IN THE TREATMENT OF SEWAGE, AND IN THE PRODUCTION OF MANURES," to be as follows :—

This Invention relates to the application and use of natural phosphates of alumina, such, for example, as those which occur in the West Indian and other islands, and which products are known in commerce as Redonda

guano, or as guano from Mason's Island, or otherwise, and consists in, firstly, subjecting such before-mentioned natural phosphates of alumina to the action of hydrochloric acid either alone or in conjunction with sulphuric acid, and the employment of the product thus obtained either alone or in conjunction with a base, such, for example, as lime for the treatment of sewage, in order that certain constituents of the same may be thereby removed, and be rendered available as a manure for agricultural purposes.

This Invention further consists in subjecting such natural phosphates of alumina as herein-before referred to to a preliminary treatment with hydrochloric acid, so as to remove certain impurities, such, for example, as carbonate of lime, and then subjecting the residuum to the action of sulphuric acid in the manner and for the purposes described in the Provisional Specification filed by us in the Office of the Commissioners of Patents on the Second day of March last, and numbered 607.

This Invention further relates to the employment of certain deodorising agents, such, for example, as animal or vegetable charcoal for the treatment of sewage in conjunction with the products derived from the natural phosphates of alumina after having been treated as before mentioned.

The proportions in which the deodorising agents are to be employed will depend upon the degree of deodorization it is desired to obtain and the condition of the sewage under treatment. A quantity equal to from about twenty to fifty per cent. by weight of the natural phosphate of alumina originally employed will give good results, but we do not limit ourselves to these proportions.

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**SPECIFICATION** in pursuance of the conditions of the Letters Patent, filed by the said David Forbes and Astley Paston Price in the Great Seal Patent Office on the 19th October 1870.

**TO ALL TO WHOM THESE PRESENTS SHALL COME**, we, DAVID FORBES, Consulting Engineer, of York Place, Portman Square, and ASTLEY PASTON PRICE, Consulting Chemist, of 47, Lincoln's Inn Fields, both in the County of Middlesex, send greeting.

**WHEREAS** Her most Excellent Majesty Queen Victoria, by Her Letters Patent, bearing date the Nineteenth day of April, in the year of

our Lord One thousand eight hundred and seventy, in the thirty-third year of Her reign, did, for Herself, Her heirs and successors, give and grant unto us, the said David Forbes and Astley Paston Price, Her special license that we, the said David Forbes and Astley Paston Price, our executors, administrators, and assigns, or such others as we, the said David Forbes and Astley Paston Price, our executors, administrators, or assigns, should at any time agree with, and no others, from time to time and at all times thereafter during the term therein expressed, should and lawfully might make, use, exercise, and vend, within the United Kingdom of Great Britain and Ireland, the Channel Islands, and Isle of Man, an Invention for "IMPROVEMENTS IN THE TREATMENT OF SEWAGE, AND IN THE PRODUCTION OF MANURES," upon the condition (amongst others) that we, the said David Forbes and Astley Paston Price, our executors or administrators, by an instrument in writing under our hands and seals, should particularly describe and ascertain the nature of the said Invention, and in what manner the same was to be performed, and cause the same to be filed in the Great Seal Patent Office within six calendar months next and immediately after the date of the said Letters Patent.

NOW KNOW YE, that we, the said David Forbes and Astley Paston Price, do hereby declare the nature of our said Invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement :—

Our said Invention relates, firstly, to the application and use of natural phosphates of alumina, such, for example, as those which occur in the West Indian and other islands, and which products are known in commerce as Redonda guano or as guano from Mason's Island or otherwise, and consists, firstly, in subjecting such before mentioned natural phosphates of alumina to the action of hydrochloric acid either alone or in conjunction with sulphuric acid, and the employment of the product thus obtained either alone or in conjunction with a base, such, for example, as lime, for the treatment of sewage in order that certain constituents of the same may be thereby removed and be rendered avaliable as a manure for agricultural purposes.

In carrying out this first part of our Invention we firstly submit to the action of hydrochloric acid or a mixture of hydrochloric and sulphuric acids, the natural phosphates of alumina, which phosphates of alumina are capable of being decomposed and rendered soluble by the employment of such acid or acids. Having converted the phosphates

into a soluble condition, or having obtained a solution of the phosphates of alumina they may either be employed in their concentrated form, or a solution of the same may be diluted with water, and they are then in a fit and proper condition to be employed for the treatment of sewage. Whilst the sewage is contained in a cistern or reservoir or whilst it is in the act of flowing thereinto the requisite proportion of the soluble phosphates of alumina is to be added thereto, and after thorough admixture with the sewage by the use of agitators or other well known means, the sewage so treated may be allowed to remain tranquil in the reservoir, in order that subsidence of the resulting precipitate may be effected, or after having added to the sewage the requisite amount of the soluble phosphates of alumina a base, such as lime or carbonate of lime (by preference milk of lime), is to be added in such quantity as that the phosphates in solution shall be precipitated. This result will be known by the sewage acquiring a neutral or alkaline reaction, or the lime may be firstly added, and the solution of the phosphates of alumina added subsequently, but we prefer the former process, or the soluble phosphates of alumina may be firstly decomposed by means of a base such as lime or carbonate of lime, and the resulting precipitate may be employed for the purpose of effecting the separation of certain constituents of sewage.

In conjunction with any of the before mentioned methods of carrying out our Invention, deodorising agents, such, for example, as animal or vegetable charcoal, may be employed, but good results will be obtained by the employment of the phosphates of alumina alone or in conjunction with a base, such as lime or carbonate of lime as before mentioned. The sewage after treatment by either of the before mentioned processes is allowed to settle and the clear or supernatant water may then be run off, and the deposit or precipitate being collected and removed may be employed for agricultural or other purposes either in the moist condition or after having been submitted to a drying or desiccating process. Or the precipitated phosphates may be again submitted to the action of hydrochloric acid or to a mixture of hydrochloric and sulphuric acids, and the solution be again employed for the treatment of sewage in a manner similar to that before described. The proportions in which the soluble phosphates of alumina may be employed will vary with the sewage to be operated upon and the quality of the manure desired to be obtained, we have obtained good results by the employment of about

two parts by weight of the soluble phosphates of alumina to every one thousand parts by weight of sewage treated, but we do not limit ourselves to such proportions.

This Invention consists, secondly, in subjecting such natural phosphates of alumina as are herein-before referred to, to a preliminary treatment with hydrochloric acid so as to remove certain impurities, such, for example, as carbonate of lime, and then subjecting the residuum to the action of sulphuric acid in the manner and for the purposes described in the Specification of Letters Patent granted to us and bearing date the Second March One thousand eight hundred and seventy, No. 607.

Having now described and particularly ascertained the nature of our said Invention and the manner in which the same is or may be used or carried into effect we would observe in conclusion that what we consider to be novel and original and therefore claim as the Invention secured to us by the herein-before in part recited Letters Patent is,—

First. The use of the natural phosphates of alumina for the treatment of sewage and for the production of manure, by firstly submitting the natural phosphates of alumina to the action of hydrochloric acid or mixtures of hydrochloric and sulphuric acids, and the employment of such resulting products either alone or in conjunction with a base, such as lime or carbonate of lime, for the treatment of sewage, substantially in the manner herein-before described.

Second. The subjecting of the herein-before mentioned natural phosphates of alumina to a preliminary treatment with hydrochloric acid for the purposes herein-before mentioned.

In witness whereof, we, the said David Forbes and Astley Paston Price, have to this our Specification set our hands and seals, the Nineteenth day of October One thousand eight hundred and seventy.

DAVID FORBES. (L.S.)
ASTLEY PASTON PRICE. (L.S.)

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